

REMARKS

The present application includes claims 1-35. Claims 1-35 were rejected by the Examiner. By this amendment, claims 1, 18 and 31 have been amended.

Claims 1-16, 18-29 and 31-35 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Klausz (U.S. Patent No. 4,633,494).

Claims 17 and 30 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Klausz in view of Boyer (U.S. Patent No. 5,295,200).

The rejection of claims 1-16, 18-29 and 31-35 under 35 U.S.C. § 103(a) as being unpatentable over Klausz is respectfully traversed.

As explained more fully below, prior art systems to Klausz ran continuously while the patient was positioned, thus exposing the patient to X-rays at full imaging intensity during the entire positioning process. Klausz improves over the prior art by not running the x-ray machine continuously at full imaging intensity during the entire positioning process and instead taking "snapshots" at full imaging intensity once the patient has been positioned in order to verify position. Note that even though the x-ray machine is not run continuously in Klausz, the snapshots are still taken at full imaging intensity and Klausz does not teach any variance in the intensity/radiation level. Conversely, in the present innovation, position images are taken at an intensity less than the full imaging intensity level, preferably at 1-4% of the full imaging intensity level. Klausz does not teach taking snapshot images at any intensity less than full imaging intensity.

As depicted in Figure 1 of Klausz, a patient lies on a table 12 between an X-ray source 11 and a receiver 13. The X-ray source 11 emits a full dose of radiation and the

receiver 13 receives the incident radiation. The receiver transmits values of the pixels of the full dose X-ray image to an image memory 17. The values of all the pixels of the full dose X-ray image are stored in the image memory 17. The values of all the pixels are then read from the image memory 17 and reproduced on the screen of a television receiver 14.

If desired, the table 12 is displaced and the image on the screen of the television receiver 14 is decentered (shifted) so as to reproduce an image of what would be observed if an X-ray were taken at the new desired table position. (Col. 4, Lines 35-65). As the image reaches a maximum decentering, the process is repeated with the patient being subjected to another full dose of X-rays and the new image being stored in the image memory 17. Thus, the patient is repeatedly subjected to a full dose of X-rays until the desired X-ray image position is obtained.

Consequently, Applicant agrees with the Examiner's statement that Klausz does not disclose imaging a patient with a low-dose pre-shot prior to imaging the patient with a full dose exposure. However, Applicant does not agree that it would have been obvious to modify Klausz to incorporate imaging a patient with a low-dose pre-shot prior to imaging the patient with a full dose exposure.

Under MPEP § 2143, a *prima facie* case of obviousness requires three criteria to be met:

- 1) there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings;
- 2) there must be a reasonable expectation of success; and
- 3) the prior art reference (or references when combined) must teach or suggest all the claim limitations.

Klausz fails to meet all the criteria. Klausz teaches taking "snapshots" at full imaging intensity once the patient has been positioned in order to verify position instead of running the x-ray machine continuously at full imaging intensity. However, Klausz does not teach taking snapshot images at any intensity less than full imaging intensity.

Applicant has amended independent claims 1, 18 and 31 to more clearly recite that the radiation dose level of a low-dose pre-shot is less than the radiation dose level of a full dose exposure. Klausz does not teach the claim limitation contained in amended claims 1, 18 and 31 of imaging the patient with a low-dose pre-shot to determine a low-dose image, wherein the radiation dose level of said low-dose pre-shot is less than the radiation dose level of a full-dose exposure. Thus, Klausz does not meet the criteria of teaching all the claim limitations.

Additionally, because the prior art does not teach the above claim limitation, there can be no motivation to combine teachings because a combination of the teachings would still not produce the claim limitation. Likewise, if the claim limitation is not taught by the prior art and motivation to combine does not exist, then there cannot be a reasonable likelihood of success. Thus, all the criteria for *prima facie* obviousness have not been met.

Consequently, the Applicant respectfully submits that amended independent claims 1, 18 and 31 and their respective dependent claims 2-16, 19-29 and 32-35 are not rendered obvious by Klausz and should be allowable.

The rejection of dependent claims 17 and 30 under 35 U.S.C. § 103(a) as being unpatentable over Klausz in view of Boyer is respectfully traversed. As presented above,

Klausz does not teach taking snapshot images at any intensity less than full imaging intensity. Like Klausz, Boyer does not teach taking snapshot images at any intensity less than full imaging intensity. This limitation is recited in claims 1 and 18 from which claims 17 and 30 depend. Boyer does not remedy the shortcomings of Klausz. Consequently, it is respectfully submitted that dependent claims 17 and 30 should be allowable for the same reasons as those presented above with respect to amended independent claims 1, 18 and 31.

As an additional matter, throughout the Office Action the Examiner has made various statements in conjunction with the obviousness rejections without citing support for the statements in any of the prior art. Additionally, in several instances, the Examiner admits that a claim element is not shown in the prior art, but proceeds to find the claim element obvious nonetheless. Because of the manner in which the statements are worded, the Applicant is unsure if these statements are intended to constitute Official Notice on the part of the Examiner. In case the Examiner is taking Official Notice, for example, of facts in the Examiner's personal knowledge rather than the prior art, the Applicant respectfully traverses each of the Examiner's assertions. Under MPEP § 2144.03, the Examiner is now obligated to cite references in support of the Examiner's assertions. Alternatively, if the Examiner's assertions are based on facts within the personal knowledge of the Examiner, the facts must be supported by an affidavit from the Examiner. More specifically, Applicant traverses the Examiner's assertions with regard to the following:

With regard to claims 1, 18 and 31, the Examiner admitted Klausz does not explicitly disclose a method wherein imaging the patient utilizes a low dose pre-shot and subsequently imaging the patient with a full dose exposure, but then the Examiner stated:

“It would have been obvious to modify the method of Klausz such that it incorporated the step of imaging a patient with a low dose pre shot and subsequently with a full dose exposure. One would have been motivated to make such a modification so that the position determining steps do not sufficiently add to the total radiation exposure experienced by a patient, since it is commonly understood that elevated levels of radiation exposure are capable of causing significant cellular damage in living tissue.”

Applicant respectfully traverses this assertion by the Examiner. The Examiner’s assertion is not well known in the art as evidenced by the cited prior art, for example Klausz and Boyer. If the Examiner’s assertion was well known, it would appear in the prior art. However, even after the Examiner’s exhausted search, the Examiner has been unable to find any reference teaching the Examiner’s assertion. Consequently, it is respectfully submitted that the Examiner’s assertion is not commonly known in the art and the Examiner’s finding of Official Notice is respectfully traversed.

With regard to claims 2 and 19, the Examiner admitted Klausz does not explicitly disclose a method wherein the adjusting step includes adjusting the positioning of the patient and then re-imaging the patient with a second low dose pre-shot prior to imaging the patient with a full dose, but then the Examiner stated:

“It would have been obvious to modify the method of Klausz such that it incorporated the aforementioned limitation. One would have been motivated to make such a modification so that an operator could verify the intended position of a patient prior to imaging as suggested by Klausz...”

Applicant respectfully traverses this assertion by the Examiner. The Examiner's assertion is not well known in the art as evidenced by the cited prior art, for example Klausz and Boyer. If the Examiner's assertion was well known, it would appear in the prior art. However, even after the Examiner's exhausted search, the Examiner has been unable to find any reference teaching the Examiner's assertion. Consequently, it is respectfully submitted that the Examiner's assertion is not commonly known in the art and the Examiner's finding of Official Notice is respectfully traversed.

With regard to claims 3-6 and 20, the Examiner admitted Klausz does not explicitly disclose a method wherein low dose pre shots are defined and wherein the imaging parameters are varied between low dose pre-shot and full dose exposure and varied according to patient size and anatomical view, but then the Examiner stated:

"It would have been obvious to modify the method of Klausz such that it incorporated the step of defining low dose pre-shots and full exposure and wherein the imaging parameters are varied between low dose pre-shot and full dose exposure. One would have been motivated to make such a modification so that exposure levels can be adjusted to limit the total radiation exposure experienced by a patient. Additionally, it would have been obvious to further modify the disclosed method so that the imaging parameters are selectively alterable between low dose and full exposure so that generated images can be used for either positioning or internal analysis purposes. It is commonly understood that full or regular imaging doses are varied with respect to the intended imaging areas (i.e. thorax vs. abdominal) so that generated images are of high quality, enabling easy identification of elements within the internal structure of a patient."

Applicant respectfully traverses this assertion by the Examiner. The Examiner's assertion is not well known in the art as evidenced by the cited prior art, for example Klausz and Boyer. If the Examiner's assertion was well known, it would appear in the

prior art. However, even after the Examiner's exhausted search, the Examiner has been unable to find any reference teaching the Examiner's assertion. Consequently, it is respectfully submitted that the Examiner's assertion is not commonly known in the art and the Examiner's finding of Official Notice is respectfully traversed.

With regard to claims 7-10 and 21-23, the Examiner admitted Klausz does not explicitly disclose a method wherein a) the system is controlled by a technician from a remote acquisition console b) the system is controlled automatically and c) wherein low dose pre-shots generate images within one and five seconds, but then the Examiner stated:

"It would have been obvious to further modify the method of Klausz such that it incorporated the above limitations. One would have been motivated to make such a modification so that a technician is not exposed to radiation as the system is operated. Additionally, it would have been obvious to modify the method so that the system is capable of automatically carrying out a series of image generations, thereby reducing examination time and radiation exposure to the patient."

Applicant respectfully traverses this assertion by the Examiner. The Examiner's assertion is not well known in the art as evidenced by the cited prior art, for example Klausz and Boyer. If the Examiner's assertion was well known, it would appear in the prior art. However, even after the Examiner's exhausted search, the Examiner has been unable to find any reference teaching the Examiner's assertion. Consequently, it is respectfully submitted that the Examiner's assertion is not commonly known in the art and the Examiner's finding of Official Notice is respectfully traversed.

With regard to claims 11-16 and 24-29, the Examiner admitted Klausz does not explicitly disclose a method wherein imaging includes imaging a patient with a low dose X-ray imaging sequence, wherein frames occur at a rate of at least 5 frames per second and the sequences are sub-sampled prior to processing, but then the Examiner stated:

“It would have been obvious to further modify the method of Klausz such that it incorporated the above limitations. One would have been motivated to make such a modification so that the system is configured to acquire multiple images of a patient in which ideal positioning can be determined. A benefit of achieving high frame rates, such as that of at least 5 frames per second is that initial patient setups can be accomplished in a short amount of time thereby reducing the total examination time experienced by a patient. Additionally, it would have been obvious to modify the disclosed method so that multiple image data are collected and optimally arranged, so that system components do not experience “slow down” during processing, due to the large amount of information contained in obtained image sets. A benefit of such a modification is that it assists in reducing examination time by enabling data to be quickly analyzed.”

Applicant respectfully traverses this assertion by the Examiner. The Examiner’s assertion is not well known in the art as evidenced by the cited prior art, for example Klausz and Boyer. If the Examiner’s assertion was well known, it would appear in the prior art. However, even after the Examiner’s exhausted search, the Examiner has been unable to find any reference teaching the Examiner’s assertion. Consequently, it is respectfully submitted that the Examiner’s assertion is not commonly known in the art and the Examiner’s finding of Official Notice is respectfully traversed.

With regard to claims 32-35, the Examiner admitted Klausz does not explicitly disclose a method wherein processing includes providing zero point parameters,

saturation management parameters, field of view parameters or physical filter parameters, but then the Examiner stated:

"It would have been obvious to further modify the method of Klausz such that it incorporated the aforementioned limitations. One would have been motivated to make such a modification so images are optimized for high quality display, wherein artifacts synonymous with the alteration between varying levels of radiation is minimized."

Applicant respectfully traverses this assertion by the Examiner. The Examiner's assertion is not well known in the art as evidenced by the cited prior art, for example Klausz and Boyer. If the Examiner's assertion was well known, it would appear in the prior art. However, even after the Examiner's exhausted search, the Examiner has been unable to find any reference teaching the Examiner's assertion. Consequently, it is respectfully submitted that the Examiner's assertion is not commonly known in the art and the Examiner's finding of Official Notice is respectfully traversed.

With regard to claims 17 and 30, the Examiner admitted Klausz does not explicitly disclose a method wherein verifying includes automatic verification using a computer algorithm, but then the Examiner stated:

"It would have been obvious to modify the method of Klausz such that it incorporated automatic verification of pre-shot images using a computer algorithm. One would have been motivated to make such a modification so that an operator is able to obtain ideal patient position information based on processor analysis of ideal settings or recognized image shifts. A benefit of such a modification is that patient positioning can be optimized based on algorithmic calculations for ideal image capture as taught by Boyer..."

Applicant respectfully traverses this assertion by the Examiner. The Examiner's assertion is not well known in the art as evidenced by the cited prior art, for example

Klausz and Boyer. If the Examiner's assertion was well known, it would appear in the prior art. However, even after the Examiner's exhausted search, the Examiner has been unable to find any reference teaching the Examiner's assertion. Consequently, it is respectfully submitted that the Examiner's assertion is not commonly known in the art and the Examiner's finding of Official Notice is respectfully traversed.

CONCLUSION

The Applicant looks forward to working with the Examiner to resolve any remaining issues in the application. If the Examiner has any questions or the Applicant can be of any assistance, the Examiner is invited and encouraged to contact the Applicant at the number below.

The Commissioner is also authorized to charge any additional fees or credit any overpayment to the deposit account of GTC, account number 070845.

Respectfully submitted,

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